REMARKS

Applicant cancels claim 6. Claims 1-5 and 7-45 remain pending in the application. Claims 14-32, 37-39, and 44-45 have been withdrawn from consideration. Applicant amends claims 5, 34, and 41 to incorporate features that correspond to those of claim 6, and amends claims 1, 33, and 40 for clarification. Applicant refers to Fig. 4, page 32, line 29 to page 33, line 15 in the specification, Fig. 6, and page 34, line 3 to page 36, line 33 in the specification for exemplary embodiments of and support for the claimed invention. No new matter has been added.

Applicant acknowledges with appreciation the Examiner's allowance of claims 7-13.

Claims 1-5, 33-36, and 40-43 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2005/0157683 to Ylitalo et al.; and claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatenable over Ylitalo et al. in view of U.S. Patent Application Publication No. 2001/0101908 to Kim et al.

Claims 35-36 and 42-43 incorporate channel code features that correspond to those of allowed claims 7-13. Accordingly, Applicant respectfully requests that the Examiner also allow claims 35-36 and 42-43.

The Examiner relied upon the illustration of a space time transmit diversity encoder 10 and a beam forming antenna 40 in Fig. 11 of Ylitalo et al. as alleged disclosure of the claimed space-time encoder and beamformers, respectively.

Ylitalo et al. illustrate directional antenna arrangements in Figs. 6-11 thereof. Ylitalo et al. do not disclose, however, the features of a plurality of beamformers connected to a plurality of adders, each beamformer being configured to operate under the control of a weight control unit, which receives angle of arrival signals being estimates of the angles of arrival of signals received from the receiving apparatus, and being configured to receive a respective transmission signal and to modify the respective transmission signal by splitting

the signal into a plurality of separate signals, and multiplying each signal by a complex value being a beamformer weight, to form a plurality of digital baseband signals, which are added to the corresponding outputs of the other beamsformers in the adders.

In other words, Ylitalo et al., as cited and relied upon by the Examiner, fail to disclose,

> "[t]ransmitting apparatus which transmits a data signal to a receiving apparatus via at least two different transmission paths, comprising:
> an antenna array;
> a transmitter array connected to the antenna array;
> a plurality of adders connected to the transmitter array; and
> a plurality of beamformers connected to the adders, each beam former being configured to operate under control of a weight control unit, which receives angle of arrival signals being estimates of the angles of arrival of signals received from the receiving apparatus, and being configured to receive a respective transmission signal representing a same data signal and to modify the respective transmission signal by splitting the signal into a plurality of separate signals, and multiplying each signal by a complex value being a beamformer weight to form a plurality of digital baseband signals, which are added to the corresponding outputs of the other beamformers in the adders, such that the antenna array produces a plurality of directional transmission beams carrying respective transmission signals which are transmitted via different transmission paths to the receiving apparatus; and
> a space-time encoder which applies respectively different space-time coding to the same data signal thereby to produce space-time encoded transmission signals for transmission by the respective transmission beams," as recited in claim 1. (Emphasis added)

Accordingly, Applicant respectfully submits that claim 1, together with claims 2-4 dependent therefrom, is patentable over Ylitalo et al. for at least the foregoing reasons. Claims 33 and 40 incorporate features that correspond to those of claim 1 cited above, and are, therefore, patentable over Ylitalo et al. for at least the same reasons.

Again, Applicant amends claims 5, 34, and 41 to incorporate features that correspond to those of claim 6.

Neither Ylitalo et al. nor Kim et al. discloses or suggests the features of a space-time decoder including a channel estimator which estimates channel vectors of the transmission and which estimates channel vectors of the interference paths from one transmission path to another, and a combiner which combines the received transmission signals with the channel vectors estimated by the channel estimator to yield an output signal.

For example, as explained at page 34, line 15 to page 36, line 33 of the specification, this can be implemented by obtaining the transmitted symbols S_1 and S_2 based on the recovered symbols S_1' and S_2' using the equations:-

$S_1' = (\alpha_1^2+\alpha_2^2+\alpha_3^2+\alpha_4^2)S_1$, and $S_2' = (\alpha_1^2+\alpha_2^2+\alpha_3^2+\alpha_4^2)S_2$

In this way, the channel vectors of the interference paths from one transmission path to another are taken into account when obtaining the transmitted symbols.

The Examiner contended that Kim et al. disclose channel estimation. According to Kim et al., a SIR is calculated based on the instantaneous signal power and average interference power measured from the channel estimate and decoded data symbols of one slot interval. The SIR is compared with a given threshold to judge whether the corresponding output signal is approved. (see e.g. paragraphs [0040] and [0061]-[0063].) Thus, Kim et al. propose to take into account interference between channels by preventing channels that suffer from a high level of interference from being taken into account by the combiner. This approach clearly teaches away from the features of claims 5, 34 and 41, in which the channel estimator estimates channel vectors of the interference paths from one transmission path to another, and the combiner produces an output signal which is based on such channel vectors.

In other words, even assuming, arguendo, that it would have been obvious to one skilled in the art at the time the claimed invention was made to combine Ylitalo et al. and Kim et al., such a combination would still have failed to disclose or suggest,

> "[r]eceiving apparatus which receives a plurality of transmission signals and outputs a combined signal based on the plurality of transmission signals, comprising:
>
> a receiver configured to receive a plurality of transmission signals representing a same data signal carried in respective directional transmission beams via respective transmission paths, and to separate the plurality of transmission signals; and
>
> a space-time decoder which is configured to decode the transmission signals which have been differently space-time coded by respective space-time coding,
>
> wherein the space-time decoder comprises a channel estimator which estimates channel vectors of the transmission paths and which estimates channel vectors of interference paths from one transmission path to another, and a combiner which combines the received transmission signals with the channel vectors estimated by the channel estimator to yield an output signal," as recited in claim 5. (Emphasis added)

Accordingly, Applicant respectfully submits that claim 5 is patentable over Ylitalo et al. and Kim et al., separately and in combination, for at least the foregoing reasons. Claims 34 and 41 incorporate features that correspond to those of claim 5 cited above, and are, therefore, patentable over the cited references for at least the same reasons.

In view of the remarks set forth above, this application is in condition for allowance which action is respectfully requested. However, if for any reason the Examiner should consider this application not to be in condition for allowance, the Examiner is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Any fee due with this paper may be charged to Deposit Account No. 50-1290.

Respectfully submitted,

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